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ORIGINAL ARTICLES.

THE CORRECTION OF ANISOMETROPIA.

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PROFESSOR OF DISEASES OF THE EYE IN THE PHILADELPHIA POLYCLINIC, SURGEON TO WILLS EYE HOSPITAL, PHILADELPHIA.

It is a very common belief that the principal advantage of consulting the ophthalmic surgeon as to the fitting of glasses, is that by so doing the glasses will be adapted to compensate for any natural difference between the two eyes; the difference between the two eyes, as to focus, being regarded as the serious condition that requires the exercise of his special skill. It is the universal rule laid down in text-books of ophthalmology, and practiced by all who attempt to make exact measurements of the refraction of the eye, to test the two eyes separately; and in general to give each eye its proper correcting lens. This is done unless the difference between the two eyes is so great that they can not be made to work together; in which case, the general rule is to correct the refraction of the better eye, and to give the other eye a corresponding glass, disregarding in the main, the condition of refraction present in it.

There has been, however, no general scheme of clearly formulated rules by which it might be determined when a particular case presented such differences in the refraction of the two eyes as to preclude the probability or possibility of their being habitually used in accurate binocular vision; nor have

the factors which enter into the determination of these limits for the proper correction of anisometropia been generally studied or carefully discussed. Anisometropia like ametropia in general makes trouble either by preventing perfect vision, or by making it difficult to attain, so that the benefit of it is only secured at the cost of eye-strain. And, as with the various forms of ametropia it is in the higher degrees and in later life that it entails imperfect vision; and in the lower degrees and earlier life that it causes eye-strain.

The careful investigations as to the normal power of overcoming differences of focus between the two eyes by differences of accommodation, reported by A. Fick, of Zürich ("On Unequal Accommodation in Healthy Eyes and in Anisometropia," *Archives of Ophthalmology*, 1889, p. 292) in direct contradiction to those of earlier observers indicate that there is some power of overcoming anisometropia by unequal accommodation, but the extent of inequality that may be thus overcome is strictly limited to 1. D. or at the most 1.5 D. Some of Fick's observations in this direction I have been able to partly confirm. When the amount of anisometropia is less than 1. D. or 1.5 D., the patient may not be conscious of seeing any better with one eye than the other, and equally good and simultaneous vision may be found on careful testing; but the use of the eyes entails symptoms of eye-strain that may be out of proportion to the refractive error in either eye considered alone.

Where in one eye the ametropia is of such low degree as not to entail eye-strain, while the difference of refraction between the two eyes is so great as to preclude the focusing of both together upon the same object, the patient will not suffer from eye-strain. If, however, the second eye presents ametropia of low degree, distinctly differing in kind or degree from the ametropia of the first eye, symptoms of eye-strain are very liable to develop. This class of cases may be illustrated by the following:

Miss M, aged 28 years, teacher, no dimness of vision. Has long suffered from repeated attacks of inflammation of the eyes and of the lids, with severe headache, closely connected with the use of the eyes for accurate seeing. These symptoms have largely limited her capacity for eye work for some years. Under atropine, she was found to present, in the right eye, mixed astigmatism of 1.25 D., and the left 0.25 D. of

hyperopia. There was nothing in her history pointing especially to defect of the right eye.

The correcting glasses were given and worn constantly. Four months later she had been free from any trouble with the eye or headache, "found the glasses a great comfort," and used her eyes "three times as much as before."

In contrast to the above, we take the following: Miss E., aged 32 years, keeping house, has always had defective vision in the right eye. Three years ago she was troubled with headaches and got a pair of glasses, right and left 1.5 D., spherical convex, which relieved her entirely. She consulted me to see what could be done to improve vision in the right here.

Her vision was R., $^4/_{LXXX}$; L., $^4/_{IV}$ partly.

Under a mydriatic:

R., + 0.25 sph. ⊃ + 6. cyl. ax. 112°, V.=$^4/_X$.

L., + 2. sph. ⊃ + 0.37 cyl. ax. 110°, V=$^4/_{IV}$.

She was ordered:

R., + 6 cyl. ax. 112°.

L., + 1.75 sph. ⊃ + 0.37 cyl. ax. 110°.

Which pleased her with the greatly improved vision of the right eye, but gave her little or no more complete immunity from headache and eye strain than had her spherical lenses.

It might seem that the physiological ability to overcome differences of refraction between the two eyes would fix the degree an anisometropia capable of perfect correction by lenses, and probably the psychical power of binocular fusion is to some extent determined by these limits of the normal power of unequal accommodation. But in the main, the proper limits for the full correction of anisometropia are determined by other factors. One of the most important of these factors is the prismatic effect of the peripheral portion of a lens. This increases with the distance from the optical centre at a rate proportioned to the strength of the lens.

At the optical centre, the rays being unrefracted, the object is seen in its true direction, whatever the strength of the lens. When, however, the visual axis does not pass through the optical centre, the object looked at suffers an apparent displacement, proportioned to the strength of the lens, and the distance of the visual axis from the optical centre. When the two eyes look through points equally distant in the same direction from the optical centre, as when we look obliquely through

centered lenses placed before the two eyes, if the lenses be of equal strength, the apparent displacement of the object seen will be the same for both eyes. If, however, the lenses differ in kind or strength, the apparent displacements of the point looked at will correspondingly differ; and, in order to bring the impression of that point upon the fovea in each eye, the visual axes will need to be turned in somewhat different directions. The power to turn the visual axes in different directions varies in different individuals, but is definitely limited in all. This limit is narrowest in the vertical direction. Most persons are unable to turn one visual axis more than two degrees (four centrads) above or below the other. Laterally, the difference may be greater, double this amount for outward deviation and double that of convergence.

When correcting glasses are looked through obliquely, if they are of unequal strength, the visual axes are compelled to take this abnormal position, and the difference in direction between them is increased with the difference of strength of the two lenses. Increasing the difference of strength between the two glasses, or the distance of the visual axes from the respective optical centres, a point is presently reached where the difference of direction passes the limit of physiological variation for the ocular movements. When the eyes are no longer able so to turn, as to bring the two impressions of the object looked at on the foveas of both eyes, double vision commences. Hence, with decided differences of strength in the lenses, the patient is liable to see double on looking through the peripheral part of his glasses; even though the optical centres might be used with perfect satisfaction. And even before the extreme limit of variation in the direction of the visual axes is reached and double vision begins, there comes difficulty and strain in maintaining the differences of direction. So that the limit of difference within which the lenses can be used with comfort is much narrower than that within which they can be used without actual diplopia. Still this limit may be considerably increased by practice and care. Where prolonged looking is to be done, the head should be so turned that the visual axes are brought to the region of the optical centres of the lenses. The considerably wider range of possible convergence and divergence than of vertical deviation causes the diplopia first experienced to be usually vertical. Differences in the

strength of the lenses used before the two eyes are commonly limited by the risk of producing vertical diplopia, or eye-strain in the effort to avoid vertical diplopia.

With spectacle lenses of the usual size, properly mounted, the range of the visual axis is about one centimetre above or below the optical centre of the glass. The amount of deviation produced by a lens at any given distance from its optical centre, expressed in centrads which closely correspond to degrees of refracting angle is one centrad for each dioptre of lens strength, for each centimetre of departure from the optical centre. Thus a lens of 2 D. strength at 1 cm. from its optical centre causes a deviation of 2 centrads.

It follows then that two dioptres difference in the strength of the lenses before the two eyes is as much as it is generally possible to make, without causing diplopia when the patient looks through the upper or lower part of his glasses. With some patients, even this difference would be too great. Hence glasses to be used for both near and distant vision should not differ more than this in strength, unless by actual trial somewhat prolonged, it has been ascertained that the patient will tolerate a greater separation of the visual axes; or unless he prefers occasional diplopia, with the use of both eyes, to the disuse of one eye and freedom from diplopia.

If the lenses are to be used for looking in one direction only, or with the visual axis passing through a certain limited part of the glass, or where the patient is willing to put up with the diplopia, and will not suffer in the attempt to avoid it, the difference between the two glasses may be made greater than this. The amount of such difference allowable must be determined by a trial in the individual case. I have had a patient express the liveliest satisfaction with glasses that differed 4 D. in strength in the vertical meridian, and which gave her constant diplopia on looking through their upper and lower margins. But even in such a case caution must be observed, that the patient shall not injure the eyes by strain within the field of single vision.

What is commonly spoken of as the difference in size of the retinal images, produced by correcting lenses of different strengths, is simply a special instance of this unequal prismatic action in the peripheral portions of unequal lenses; and the confusion and eye-strain associated therewith come about,

not by reason of the mere inequality of size of the images, but through the difference of position of what should be corresresponding points to which attention is directed. The annoyance and pain are of the nature of eye-strain from muscular faults, entailing a similar effort to avoid binocular diplopia.

The extent of the tendency to diplopia being dependent on the distance of the point looked through from the optical centre, and this distance being proportioned to the distance of the lens in front of the centre of rotation of the eye, it follows that the placing of the lenses as close as possible to the eye will allow of greater differences in their strength without increased inconvenience or liability to diplopia, the eye being able to turn so as to command as large a field of fixation through a smaller portion of the lens. On this account lenses for the correction of anisometropia may be brought as close to the eye as practicable. Care as to this point in their mounting may make the difference between comfort and discomfort, success and failure.

It is probable that when an eye has never been used for purposes of accurate vision, there exists a corresponding lack of development in the visual centers, which renders the use of the two eyes together at first especially difficult. This increases the inconvenience and annoyance that necessarily attend any change of lenses. But this lack of development may be partly or wholly overcome by prolonged effort; and if the difference between the two lenses be not so great as to cause actual diplopia, and the patient's nervous system is not especially liable to be disturbed by unusual effort, lenses given for the correction of anisometropia, which at first give little or no relief, will at the end of the period of adaptation prove perfectly satisfactory. It may usually be safely predicted if the annoyance caused is not entirely constant during the first few days, that in time it will entirely disappear, in young people. At, and after, middle life, less must be attempted in this direction.

In another considerable class of cases, where the anisometropia is of high degree, or when one eye is ametropic or amblyopic, true binocular vision is not to be obtained, even by the full correction of the anisometropia. In these cases, the vision of the worse eye being very imperfect the impressions made upon it have been habitually disregarded, and even with

the use of lenses, can not be brought to influence much the conscions perception of objects directly looked at. Such eyes count for little except to extend the peripheral field of vision. In these cases, the correction of anisometropia will cause no annoyance. But at the same time it will not give good binocular vision; and if it does not improve vision in the peripheral portion of the field, such a correction is useless; and, it may be as well simply to give for the worse eye such a spherical lens as will balance the correcting lens of the better eye.

In ascertaining whether in a given case it will be wise to fully correct the anisometropia present, much may be learned by simply placing the proper lenses in the trial frame, and allowing the patient to use them, after the effect of the mydriatic has fully passed away. In doing this, the object is not to make a prolonged trial, since nothing short of weeks or months will entirely reveal the individual power of adaptation; but is rather to make a short trial of various sorts of eye work, especially of habitual acts such as looking up suddenly to a distance, reading in various positions, and working at some habitual labor, as for instance, posting books where it is necessary to turn the eyes frequently from one position to another. In this way the amount of annoyance likely to be caused in the early use of the glasses, and the effect this will have upon the individual may be noted; and from them the surgeon can judge as to whether it is best to order the correction for habitual use.

In some few cases we may reach the full correction of anisometropia by the temporary use of a partial correction. When this is attempted the deduction from the full correction should be made mainly as regards the spherical lens, although in cases in which the difference is mainly in the amount of astigmatism, or in the direction of the principal meridians of astigmatism, a deduction may also be made from the full cylindrical correction. In becoming accustomed to glasses correcting anisometropia, little progress can be hoped for unless the glasses are worn continuously.

Where anisometropia has arisen from changes in refraction in one eye, or unequal change in both, causing eye-strain, with perhaps heterophoria, or even actual squint, or, if these other conditions have been developed as effects of previously existing anisometropia, complete relief of symptoms may be

expected from its proper correction. If, however, they have existed for a great length of time, squint or heterophoria may remain permanently or require operative treatment. Where the anisometropia is congenital, or of sufficient amount to have prevented the habitual use of one of the eyes, there may be some gain, often considerable, in the acuteness of vision of the previously unused eye. Although this gain may not seem very great, looked at from the standpoint of the scientific standard of visual acuteness, it is again that is generally highly appreciated by the patient. The amount of such gain in the individual case can not be well predicted. It is only to be ascertained by actual trial. Hence the prognosis regarding it, while encouraging, can not be very definite.

A CASE OF RUPTURE OF THE LIGAMENTUM PECTINATUM (CYCLODIALYSIS), IRIDODIALYSIS AND DISLOCATION OF THE LENS DUE TO CONTUSION.

BY ADOLF ALT, M.D., ST. LOUIS, MO.

[*With Micro-Photographs.*]

W. D., a laborer, 57 years old, consulted me on October 13, 1894. Three hours previously, while he was splitting wood, a large piece had struck his right eye, rendering him almost insensible with pain, and destroying vision at once.

I found an intensely congested eye, a large abrasion of the outer lower quadrant of the cornea and the anterior chamber completely filled with blood.

Under palliative treatment the blood became very slowly absorbed and gradually a large iridodialysis upwards and inwards (on the side diametrically opposite to where the wood struck the eye), became visible. When the anterior chamber was nearly free from blood, it was evident that the crystalline lens, though almost normal in transparency, was dislocated down and outward and it floated back and forth with the movements of the eyeball. When it became possible to illumi-

nate the background of the eye, large a small hæmorrhagic opacities were seen floating in the vitreous body. Gradually the optic nerve became visible and appeared very anæmic.

At this stage the eye had apparently lost all irritability and the patient wanted to return to his work. When I discharged him eight weeks after the occurrence of the injury his vision in this eye was not much more than perception of light.

On June 2, 1895, he returned with the statement, that the injured eye had two weeks previously suddenly become inflamed and very painful and particularly so at night time. The eye was again intensely congested, the pupil was large, the iris pressed forward in a down and outward direction by the dislocated crystalline lens. The tension was increased and the ciliary region painful on pressure. No light reflex could be obtained from the interior.

The patient now demanded the removal of this painful eye and I performed the operation the next day. The healing was uneventful.

In examining the hardened eyeball I first made meridional sections through the parts of greatest interest, namely, the site of the iridodialysis. The detached iris tissue, besides being considerably contracted toward the sphincter edge, is atrophic, and contains a large quantity of blood pigment, and of uveal pigment which is partly enclosed in cells, partly free. The walls of its bloodvessels are considerably thickened. The uveal layer is very thick, wrinkled and folded concentrically. The free torn edge is tilted backwards. The sections do not show any union of what may be termed the anterior and the posterior flap of the tear, as I have seen it many times after an iridectomy or injury to the iris and as I have described it in the *Archives of Ophthalmology and Otology*, Vol. IV, Nos. 3 and 4. In this specimen there is simply a ragged edge.

On viewing the part from which the iris-periphery had been torn, the most interesting point of this eye was found. Inward of Schlemm's canal where the tendon of the ciliary muscle and the ligamentum pectinatum should have been, there lies only an accumulation of pigment molecules. (See Fig. 1). Such molecules can also be traced through the fissures of the scleral tissue and into Schlemm's canal. The inner surface of the sclerotic backwards from this point is covered by some longitudinal muscular fibres only. The ciliary

body itself is found quite a distance (about 4 mllms.) farther back, indeed in a portion of the site of this cyclodialysis as far back as the entrance of an anterior ciliary artery. (See Fig. 2). Its shape is considerably altered by the retraction and the contraction of its muscular fibres. It is firmly attached to the inner surface of the sclerotic by newly formed connective tissue. Its processes, being closely folded and pressed upon each other, have grown together.

On the anterior surface of this retracted ciliary body and near its attachment to the sclerotic sits (in meridional sections) a small teet-like elevation which reaches farther on either side than the iridodialysis does and which, as I think, can not be taken for anything else, than the remnants of the tendon of the ciliary muscle and ligamentum pectinatum. (See Figs. 3 and 4, both taken from a portion outside of and near to the iridodialysis.) The pigment molecules, above mentioned, lying attached to the torn inner wall of Schlemm's canal are, as it seems due to an adhesion of the anterior iris surface to it, which at one time existed and later has disappeared, at least so it would appear from Fig. 3, or they may be remnants of hæmorrhages into the anterior chamber and pigment cells shed and destroyed earlier in the history of the case.

In front of this cyclodialysis, Descemet's membrane is wrinkled and for some distance retracted toward the center of the cornea and a considerable amount of pigment is adherent to its endothelial cells which have undergone changes as described by me in Nos. 2 and 3, 1896, of this journal.

On the side opposite this cyclo- and iridodialysis the dislocated crystalline lens has pressed the iris forward against the inner surface of the cornea Thus an adhesive inflammation (see Fig. 5) has been started by which the iris-angle is closed up. Here, also, blood pigment and cellular pigment molecules choke up all the fissures of the ligamentum pectinatum and lie within Schlemm's canal. (See Fig 6). In equatorial sections this condition prevails almost in all sections of the circle.

In the meridional sections this adherent portion of the iris appears very much folded and wrinkled; its pupillary edge has assumed a peculiar beak-like shape and the anterior endothelial layer together with some, probably newly formed, connective tissue is in parts detached in form of a thin membrane.

Iris and ciliary body, in fact all the tissues show signs of

a recent inflammatory process by considerable round-cell infiltration. Remains of hæmorrhages are found everywhere.

The histological conditions of Schlemm's canal readily explain the increased intra-ocular pressure.

I am not aware of the observation of a similar case of cyclodialysis and this is the first time that I have met with such a condition. This unique feature of the case alone prompts me to report it.

The further changes in the posterior portions of the eye, though otherwise of interest, I do not think of importance here.

ACQUIRED AMBLYOPIA. M. L. FOSTER (*Annals of Ophthalmology and Otology*, Vol. V, No. 11).

A young man, 20 years of age, consulted me in September, 1892, to have his eyes examined preparatory to entrance into the Massachusetts Institute of Technology. At that time the vision of each eye was $^{20}/_{XV}$; there was no astigmatism, manifest hypermetropia or muscular insufficiency, and only one dioptre of latent hypermetropia. His only ocular trouble was a certain amount of chronic conjunctivitis. He became an indefatigable student in the Institute, and in the following April returned to me with this history: One night during January, he passed from 8 P. M. to 7 A. M. doing some very fine mechanical drawing. He was then seized with a pain in his right eye which radiated backward and down into the neck. This pain persisted and about March a less amount of pain appeared in the left eye. At the time of his second visit to me, April, 1893, the vision of his right eye was reduced to $^{20}/_{X}$, while that of his left eye was as before $^{20}/_{XV}$. No improvement of the vision of the right eye could be obtained with glasses, the refractive condition was the same as formerly and nothing could be found within the eye to furnish the slightest explanation of the loss of vision.

The author advances the opinion, not positively but rather tentatively, that the amblyopia in this case was due to exhaustion of the nerve elements at the fovea centralis.

OPHTHALMIC DIGEST.

By J. ELLIS JENNINGS, M.D.,
of St. Louis, Mo.

HOT AND COLD APPLICATIONS IN THE TREATMENT OF DISEASES OF THE EYE. William Campbell Posey, M.D. (*University Medical Magazine*, August, 1896).

Each one of you, probably, has been asked the question, "Is it better to bathe the eyes with hot or with cold water?" Although this would seem to be a question which would find a ready answer, many would hesitate a moment before replying. The great majority of authors commit themselves to the doctrine of Sir Henry Drummond, which is, briefly, that the temperature of applications is a point which the patient might be suffered to judge for himself according to the degree of comfort which he derived from it. This advice is unsatisfactory and unscientific, not to mention the risk of shaking our patient's confidence in our skill. If the treatment of ocular diseases was simply a question of influencing the temperature, the indications for the employment of these agents would be quite simple, but in addition to the action which they have upon heat control, that which they exercise upon the circulation of the eye, is of no less significance from a clinical standpoint.

In inflammatory conditions, cold limits the exudation and checks the secretion by constricting the capillaries, while heat aids in the healthful repair of tissues by absorbing the exudation and by carrying the proper nourishment to the part. Again, in the early stages of inflammation, cold relieves pain both by preventing the flow of blood to the part by its contracting the bloodvessels and by its limiting the amount of exudation. In the latter stages heat relieves pain by absorbing the exudation and lessening the tension of the inflamed area. Again, heat greatly augments the diffusibility of liquids

into the eye. Bellarminoff and Dolganoff having shown that the rapidity and the amount in which drugs are absorbed after the application of the hot compress is due to a change which is wrought in the corneal epithelium.

Finally, both agents have a germicidal action. It has been found that a 1:10,000 hot solution of the bichloride of mercury is more efficacious in destroying pus-formation than a cold one of 1:2,000. Water itself from 110° to 140° C. kills many bacteria, whilst cold, even at the temperature at which it may be applied to the eye, will hinder the development of germs and even prevent their growth.

Application in Different Diseases.

Conjunctivitis.—In hyperemia of the conjunctiva, induced by ametropia or the presence of a foreign body, we have in cold a simple but effective means of restoring the membrane to its healthy condition. In these cases, the douche or the compress may be applied over the closed lids with the greatest advantage for fifteen minutes at a time. The water employed should not be too cold, or excessive reaction may follow its use.

In the severer forms of conjunctivitis, when there is a purulent inflammation or an exudate, ice is the sovereign remedy, and there is but one way to apply it and that is by the continued use of the ice compress. We need not fear disastrous results from its prolonged application, for of all the remedies we have at our command in combating this type of disease in the early stages, this is undoubtedly the best. At the commencement of the disease the board-like swelling of the lids is doubtless one of the chief causes in elevating the temperature, and, as the swelling and induration prevent the cold from gaining access to the eye, it is necessary that the treatment should be energetic and prolonged. The compresses, therefore, should be maintained night and day in such cases, and should only be desisted in when a corneal ulcer threatens or the secretion becomes excessive. If either of these two contingencies should arise, the ice-compress should be at once substituted by the hot application, and this should be persisted in for fifteen minutes every two or three hours. The hot water will relieve the stagnant condition of the corneal circulation

that has been induced by the intense chemosis of the bulbar conjunctiva, and the repair of the cornea thus favored.

Keratitis.—In treating disease of the cornea hot compresses are always indicated, never cold. As you know, the cornea is normally an avascular structure, and is dependent for its nourishment upon the tissues surrounding it. If these be diseased, a stasis in the nutritive supply of the membrane occurs, and ulceration ensues. The chief indication, therefore, in treating diseases of the cornea is to prevent this stasis. This is admirably accomplished by means of moist heat, provided it be properly applied. One of the most frequent forms of corneal ulceration that you will have to combat is phlyctenular keratitis. This disease occurs usually in children of a scrofulous diathesis, and there is no sadder sight, and no example more striking of the injury which is wrought by the ignorant application of remedies by the laity, than those employed in this disorder. It is a matter of frequent experience in the ophthalmic clinics to hear the mothers of such children recite with pride a list of all kinds of harmful and disgusting substances with which they have poulticed the eye—tea leaves, rotten apples, raw oysters, bread and milk, and potatoes are the favorite articles, and the persistency and the ignorance with which they are employed is most distressing to the intelligent practitioner. It may be well to state here, once for all, that poultices should never be employed in diseases of the globe itself, although they are at times of service in inflammations of the adnexa.

Avoiding the use of the poultice, therefore, moist heat is best applied in diseases of the cornea by the ordinary compress, which should be maintained for ten or fifteen minutes at a time four or five times daily.

Hot compresses will be found to be an excellent stimulant to sluggish ulcers, and will also hasten the absorption of nebulæ. A few drops of scalding water, applied directly to a micotic ulcer, will exert a powerful antiseptic action upon it. In interstitial inflammation of the cornea also, when the whole ureal tract is inflamed, and the ciliary body especially is hyperemic, much relief will be afforded by the prolonged and unvarying use of hot fomentations, for three to eight hours daily at periods of every two hours. Indeed, where posterior synechiæ have not yielded to atropine, and where there is a rise in

the intraocular tension, the mydriatic will have to be withdrawn, and you will be compelled to rely solely upon hot applications and the administrations of an alterative internally to lessen the inflammatory condition.

Pannus.—In the early stages of granular conjunctivitis hot water is frequently badly borne; as soon as the vascular condition of the cornea manifests itself, however, hot compresses should be inaugurated, for the inflammatory reaction which they occasion is frequently sufficient to cause the disappearance of the pannus.

One of the most distressing symptoms of phlyctenular disease is the photophobia and spasm of the orbicularis which it occasions, and you will often encounter great difficulty in applying the proper remedies to the eyes until you have caused these to subside. In urgent cases the eyes may sometimes be opened by immersing the entire head of the child in a bucket of cold water, the sense of suffocation and shock causing it to open its lids reflexly as it gasps for breath. An equally effective and less heroic measure consists in permitting a few drops of ice water to trickle between the lids, which are gently coaxed apart by the surgeon's fingers.

Iritis.—It is a matter of experience that dry heat is more efficacious than moist in soothing the pain of neuralgia. We will also find that in cases of iritis, when there is little or no secretion except the tears of reflex irritation, the dry compress is the most efficacious, while in iritis secondary to inflammations of the cornea we will have recourse to the moist compress.

In addition to its action upon the bloodvessels of the iris and ciliary body, the hot compress is invaluable on account of its increasing the absorption of drugs which are administered for the purpose of dilating the pupil. You will frequently find that mydriatics exert but little influence over the pupil in cases of iritis, even when the synechiæ are not very tenacious. Leeching and cocaine will partly overcome this, but there is nothing so efficacious as bathing the eye with water as hot as it can be borne about ten minutes before the instillation of the mydriatic.

Miscellaneous Applications.

Traumatisms.—After penetrating wounds of the eye, par-

ticularly when the iris and the lens have been injured, and you have to deal with the complication of plastic iritis and traumatic cataract, in addition to the other treatment, which you will at once institute, you will find the continuous use of the ice compress to be a potent agent in combating inflammatory reaction and in preventing the invasion of noxious germs by reducing the temperature of the parts.

Suppurative Panophthalmitis.—Hot applications are grateful from the very onset in this class of cases and may be applied almost continuously. A convenient and satisfactory method is to cover the eyes with absorbent cotton that has been soaked in bichloride solution (1:3000).

Muscular Asthenopia.—The pain arising from this condition is often allayed and the symptoms at times made to disappear by the use of hot compresses, the heat usually increasing the contractile power of the weak muscles.

Diseases of the Inner Coats.—If there is any tendency to disease of the deeper structures of the eye, such as retinitis or neuritis, it is well to avoid the use of hot applications for fear of causing further mischief by increasing congestion in these delicate membranes.

THE USE OF EXTRACT OF SUPRARENAL CAPSULE IN THE EYE. W. H. Bates, M.D., (*New York Medical Journal*, May 16, 1896).

The aqueous extract of the powder of the desiccated suprarenal capsule of the sheep is a powerful astringent and hæmostatic. When it is instilled into the eye the conjunctiva of the globe and lids is whitened in a few minutes. The effect is very decided. None of the usual astringents, including cocaine, can produce such an astringent effect. In normal eyes the extract whitens the conjunctiva and sclera when used in very weak solutions—less than one per cent. The effect is increased by repeated instillations or by the use of stronger solutions. In eyes very much congested from inflammation, the extract produces its astringent effect.

Visible bloodvessels on the cornea from specific keratitis or from trachoma disappeared from view completely after the extract was used. An eye with a foreign body on the cornea was whitened. During operations on the ocular muscles, ten-

PLATES TO DR. ALT'S PAPER. — PAGES 296–299.

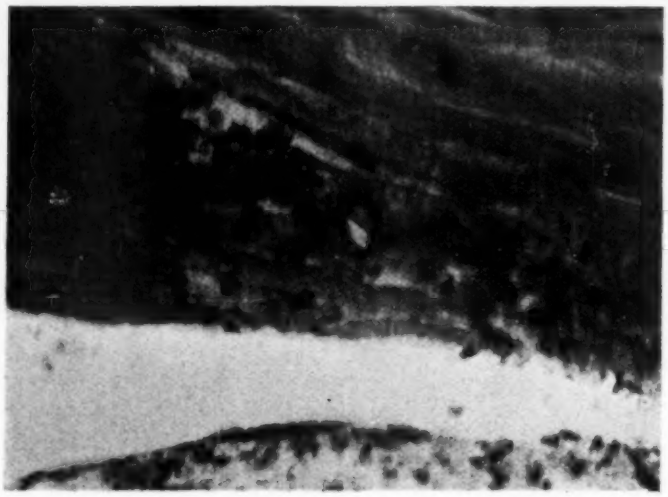

FIG. 1.

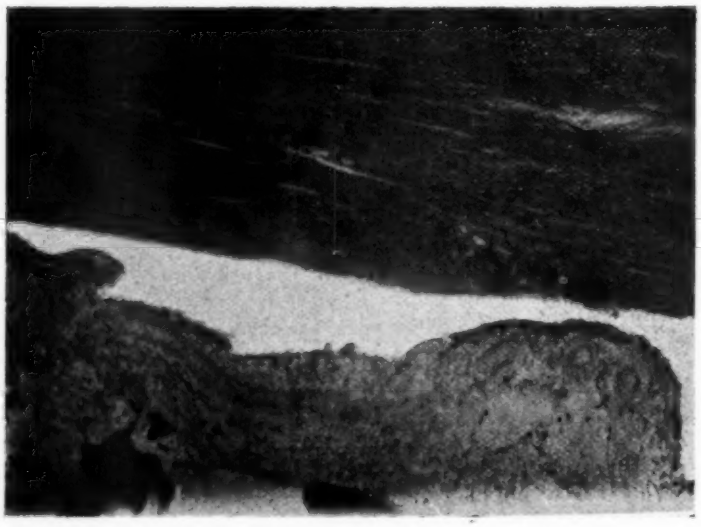

FIG. 3.

FIG. 5.

FIG. 6.

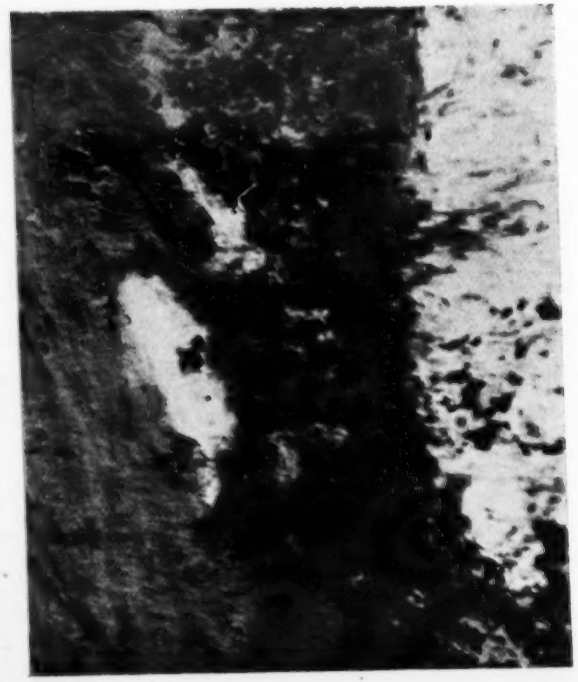

FIG. 4.

FIG. 2.

otomy and advancement, the extract whitened the eyeball. The extract is not irritating. It generally produces a cooling sensation when dropped into the eye. It does not dilate or contract the pupil, and it has no effect on the accommodation. A tolerance was not established in two cases in which the extract was instilled into the eye several times daily for more than three months.

A third patient used the extract daily for more than twelve months, and the extract whitened the eyeball and palpebral conjunctiva as well at the end of the twelve months as at the beginning. The astringent effect of the extract on the conjunctival vessels is temporary—usually in an hour the eye looks as it did before the extract was used.

Preparation.—The powder of the desiccated suprarenal gland of the sheep is placed in cold water and allowed to stand a few minutes. The fluid is filtered through filter paper and evaporated to dryness at a temperature below 105° F. The residue is the aqueous extract. It requires sixteen ounces of the powdered desiccated glands to make an ounce of the aqueous extract.

My observations on the use of the extract in the eye were made during the past two years. As this use of it is entirely new, it was necessary to be very cautious. I have had no disagreeable effects from it and my confidence in it increases constantly. It is the only remedy of which I know that is purely an astringent. It is the ideal hæmostatic. The following is a partial list of diseases of the eye in which the extract has whitened the conjunctiva and sclera: Trachoma, acute catarrhal conjunctivitis, chronic conjunctivitis, phlyctænular conjunctivitis and keratitis, interstitial keratitis, rheumatic and syphilitic iritis, episcleritis, irido-cyclitis, sympathetic ophthalmia, atrophy of the globe, secondary glaucoma, etc.

From among the cases receiving this treatment we quote the following:

CASE 2.—A severe phlyctænular conjunctivitis was treated at the dispensary. The eyeball was red and showed no white sclerotic at all. At the end of five days there was no change. A few drops of the extract whitened the eyeball at once. Two days later the eye was entirely well. In this case the extract seemed to produce a prompt and decided benefit. The patient had other treatment besides.

CASE 5. *Obstinate Iritis Following a "Needling."*—After three months' treatment with atropine and hot water the eye was still red and painful. A few drops of the extract applied at intervals of a few minutes whitened the eye and relieved the pain. There was no relapse a year later. The astringent property of the extract was undoubtedly of benefit in this case. Cases of iritis in general are undoubtedly benefited by the extract.

But as the extract is only an astringent, it can not take the place of atropine and constitutional remedies.

ON MOVEMENTS OF THE EYELIDS ASSOCIATED WITH MOVEMENTS OF THE JAWS AND WITH LATERAL MOVEMENTS OF THE EYEBALLS.

HARVEY FRIEDENWALD, M.D. (*Johns Hopkins Hospital Bulletin*, July, 1896).

Quite a number of associated movements of the upper lids have been described; these vary greatly. In some, there was ptosis, but in others the same peculiar association of movement existed without ptosis. The lid movements occurred in some in association with opening and closing or with lateral movements of the jaws, in others they were associated with lateral movements of the eyeballs.

The author gives the histories of eight cases in which the upper eyelids are raised in attempts at adduction and droop in abduction, and fifteen cases in which the opposite conditions prevail. In one case there was relaxation of the right lid in adduction and of the left in abduction. Taking the first set of cases into consideration, we find that six of the eight cases are males; that in five the condition was acquired, and in three it was congenital; in one there was no paralysis of the ocular musles, in four the ocular-motor nerve was completely paralyzed; in one the superior rectus and the levator; and in one there was double oculo-motor paralysis; and in one both superior recti were affected.

In the last named case all external movements produced nystagmus.

In two of the cases the pupil contracted during adduction, and in one there were rhythmic movements of the lid and pupil.

In the second group of fifteen cases (in which the lid is raised in abduction and droops in adduction) six were males and nine females.

The condition was congenital in twelve, in two it was acquired in infancy; in the remaining case it was acquired after oculo-motor paralysis, and disappeared in a year. There was no paralysis in four cases; the external rectus was paralyzed in ten cases, and in four of these the internal was also paretic. In one case both external and internal recti were paralyzed. The affection was limited to one eye, excepting in one case in which both eyes were affected.

In seven cases there was enophthalmus. In one of the cases there is a note that the drooping of the lid also occurred when the eyes were converged; while in another the adduction in convergence did not produce drooping, while adduction in lateral movements did.

In eleven cases the left eye was affected, in two the right eye, and in three both eyes. Finally there was one case which belongs to both classes. In this both external recti were affected, and there was slight ptosis.

It is evident that while the oculo-motor nerve is the one paralyzed in the first class of cases, it is the abducens which is chiefly affected in the second class.

No satisfactory explanation of these conditions has been given. It is probable that when acquired after paralysis they belong to the same category as those associated movements observed in hemiplegia. For the larger number, the congenital cases, we may assume the existence of abnormal relations of the cerebral nuclei and association fibres.

SPONGE GRAFTING IN THE ORBIT FOR SUPPORT OF ARTIFICIAL EYE. E. Oliver Belt, M.D. (*Ophthalmic Record*, September, 1896).

After an eyeball has been removed and an artificial eye inserted very frequently it is not as prominent as the good eye. It has a *sunken appearance* which attracts attention at once to the fact that the eye is artificial.

One of the most satisfactory operations heretofore practiced is that known as Mule's operation, which consists in the

evisceration of the contents of the eye, and the insertion of a hollow glass globe in the sclerotic. This is sewed in, and proves fairly satisfactory, but there is some danger of the globe being broken, and occasionally the stitches come out and the globe escapes. There is also the risk of sympathetic ophthalmia where the entire eyeball is not removed. To obviate these difficulties and at the same time secure a full orbit, I have devised a method of sponge grafting, which seems to meet the requirements without the disadvantage of other methods. The operation is performed as follows: The eyeball is removed by the ordinary method under strict asepsis. After all hæmorrhage is arrested the socket is washed out with formalin solution 1 to 1,000, followed by sterilized salt solution. A globe of fine soft sponge, about three-fourths the size of the eyeball (previously sterilized in five per cent. formalin solution and rinsed in the salt solution) is then inserted into the socket, or capsule of Tenon. The conjunctiva is brought together and sewed with rat-tail sutures. The eyelids are then closed with compress and bandage. In a few weeks the sponge is filled with new tissue, which in time becomes firm, solid flesh, making a full orbit and a fine support for the artificial eye. The sponge fibres are apparently absorbed.

A NEW METHOD OF TREATING PTERYGIUM.

ANTON COE, M.D. (*Annals of Ophthalmology and Otology*, Vol. V, No. 11).

Having disliked all prescribed methods for treating pterygium I have often thought that there must be a better and simpler way and after a careful reading of the literature upon this subject, I am satisfied that the whole trouble lies alone in the apex, and that the vascular supply is not a part of the disease, but only an effect, as it but answers the call of the apex for blood, and thus reasoned, that if the apex could be destroyed the vascular supply would cease, from disuse. The correctness of my reasoning will be seen by the following cases:

Case 1.—Mr. E. H., white, 64 years of age, had a *pterygium crassum* on temporal side of left eye, and a *pterygium tenue* on the temporal side of right eye. They had been

treated for some time by the usual methods with no good effect. Operation was advised, but as he was a very busy man he could not spare the time. I told him I could operate in a way that would not interfere with his occupation and so proceeded. The eye being placed under the influence of a two per cent. solution of cocaine, applied to the apex only, I heated to redness a platinum probe and applied it to the lower half of apex, leaving the upper and deeper portions for the third and fifth days. On seeing the eye again on the third day I was surprised and delighted to find that the vessels feeding the lower portion first cauterized were disappearing, and they so progressed until six days after, when there was scarcely a trace of the former trouble.

Case 2.—Mrs. B. A., 42 years of age, appeared with *pterygium tenue* on the right eye, nasal side. Five months after cauterizing the apex there was no trace of the pterygium. As I had not touched the vessels in either case, but simply removed the cause by cauterizing the apex, does it not clearly show that the disease lay wholly in the apex, and that we are guilty of an error of judgment when we remove the vascular supply as a part of the disease? The advantages of this method are, first, that the patient can be treated while sitting erect in a chair; second, there is no interruption to business or free use of the eye, and third, all signs of the growth soon vanish to return no more.

MISCELLANY.

PROFESSOR W. UHTHOFF, of Marburg, has been called to the Chair of Ophthalmology at the University of Breslau in place of Professor R. Foerster. We hear that Dr. Th. Axenfeld will accompany him to his new home.

PROFESSOR CARL HESS, of Leipzig has been called to the Chair of Ophthalmology at the University of Marburg.

WITH REGRET we have received the last number of the *Ophthalmic Record*, published by Dr. G. C. Savage, of Nashville, Tenn. The Doctor announces that if enough subscribers wish it, this journal may be brought to life again under a new management at Chicago.

SOCIETY PROCEEDINGS.

OPHTHALMOLOGICAL SOCIETY OF THE UNITED KINGDOM.

FRIDAY, JUNE 12, 1896.

The Bowman Lecture on Vision and Retinal Perception. By DR. H. SNELLEN.

DR. H. SNELLEN, Professor of Ophthalmology in the University of Utrecht, delivered the Bowman Lecture. After paying a tribute to the memory of Sir William Bowman, and to his powers as a brilliant operator and scientific physician, Professor Snellen proceeded to consider the demands made by the State on ophthalmic surgeons at the present day in regard to the examination of candidates for the public service, and pointed out that England had taken the lead among nations in this matter. The Ophthalmological Society and the British Medical Association, having each of them investigated and reported on the subject, had succeeded in impressing the authorities with a knowledge of its importance. As tending to throw light on some of the questions of vision which were still undetermined, the lecturer went on to describe the result of some investigations on vision and retinal perception which he had recently been making. Alluding to the contention of Vierordt and others that it was better to express the acuity of vision by the square of the diameter of the retinal image rather than by its linear measurement, Dr. Snellen pointed out that while the recognition of form depends on more complicated considerations than can be expressed by the simple linear measure, yet the value of perception is not fully represented by the square measure of the retinal image, inasmuch as the perceptivity of the fovea is not equal all over, but diminishes from the centre outwards. Moreover, the act of vision was not confined to the perception of a stationary retinal image, because the movements of the eye brought every part of the image over the centre of the fovea, and each muscular movement represented

a linear measure. One of the most important questions was the dependence of acuteness of vision on the amount of illumination, and the difficulty of stating the amount of illumination, especially by daylight, which varies so constantly. A fresh series of observations had been recently made on this subject at Utrecht, under Professor Snellen's direction. The observations were carried out by the light of a gas flame kept at a constant pressure by a special regulator, and passed over benzine to secure constancy of illuminating power. The photometer of Leonhard Weber was used, by means of which it was possible to estimate the amount of light on any given surface, without regard to the source of light. It was found that when the illumination reached a certain degree of intensity the unprotected eye was unconscious of any further increase of luminosity; the maximum of vision was reached with a luminosity of 30 to 50 metre candles. With decrease of illumination the vision soon diminished, and changes in intensity were were quickly perceived. The acuteness of binocular vision was higher with every degree of illumination than that of monocular vision, but the difference was not equal to doubling the intensity of the light, as had been stated. A further series of observations was made with the photometer in order to arrive at the intensity of daylight at different times in various workshops. In a printing business the want of light impeded the work of compositors when it fell below 15 metre candles; if at dusk the intensity did not fall below 15 metre candles there would be in full daylight an intensity of 30 to 50 metre candles, direct sunlight being excluded; for coarser kinds of work, like that of carpenters and blacksmiths, a minimum of 10 metre candles was enough. In the new Ophthalmic Hospital at Utrecht special arrangements of lighting the operating room had been made; the highest demands on the visual powers were made where operations on the eye had to be performed. Considering that the visual power is heightened by adaptation of the eye for a weaker light than that falling on the observed object, the walls, ceiling, and floor of the operating room had been painted black, and light was only admitted through a window directly on to the patient. By this means the operator had at his disposal the maximum of his vision; there was the additional advantage that the troublesome reflections from the cornea were avoided, and the patient's gaze

could be kept fixed in any direction by the flame of a candle which could be well seen against the dark background of the walls. The adaptation of the eye to light was next considered. Like the size of the pupil, the sensibility of the retina changed under the influence of light and darkness. The time required for adaptation corresponds with the period of anatomical changes in the retina—namely, the formation and disappearance of the visual purple, the changes in the pigment cells and cones. Observations were made with a small screen illuminated by an electric spark of great intensity. The moment the light flashed forth there appeared on the screen a bright flood of light, which rapidly increased in intensity, and then faded away in about a corresponding period of time. During the increase in intensity the light had the same color as the screen, during the decrease it had the opposite color. This occurred with all colors, provided they were sufficiently saturated. Mixed colors were seen as such, followed during the decrease by opposite mixed colors. It was found that absolute white is very rare; white paper has always a yellow or blue tint, and dead black appears as saturated blue followed by yellow. These two phases were succeeded by a third phase of much longer duration; the after-image corresponding to this third phase was very feebly colored, and was mostly of a reddish brown color; as long as this red-brown after-image persisted there was anæsthesia for objective light, such as was given by a plate of luminous paint. The third phase corresponds to the more commonly studied after-images, which arise by long continued looking at a bright object and its projection on a white surface. This interesting succession of light and dark of the after-image can also be seen on looking at a very feeble light in a darkened room; if this be done the light slowly fades and disappears altogether, but with the slightest movement of the eye it suddenly reappears, owing to its falling on a fresh part of the retina. If the light be looked at while movement of the eye is carefully avoided after disappearance, it slowly and gradually returns to its former brightness, and then slowly fades again, so that a continual slow succession of light and darkness can be observed. These phenomena are to be looked upon as an example of the reciprocal effect of the adjoining parts of the retina on each other; according to Hering's theory of color vision there is a continu-

ous reciprocal influence between the spot in the retina where the image is observed and the adjoining parts, due to a modification of the visual substance, which undergoes alternate assimilation and dissimilation. Assimilation and dissimilation can temporarily become equally great, and by reciprocal influence neutralize each other.

FRIDAY, JULY 3, 1896

EDWARD NETTLESHIP, F.R.C.S., President, in the Chair.

Experimental Research on the Course of the Optic Nerve Fibres.
By DR. C. H. USHER and DR. GEO. DEAN.

The method employed was that of wounding the retina and tracing the degeneration in the nerve fibres by means of Marchi's osmium bichromate method. The wounds were made with a Graefe's knife or galvano-cautery, the ophthalmoscope being used to enable the operator to produce the lesion in the part of the retina selected. The first part of the communication dealt with the results obtained in a number of rabbits. As seen by the ophthalmoscope the wounds in the fundus presented the appearance of a white elongated gap with sharply defined edges. Its length was from about $^3/_4$ to $1^1/_2$ optic disc diameter. Among the lesions was included division of the anterior and posterior bands of opaque nerve fibres. In all the cases a tract of degeneration was found in the nerve corresponding to the wounded retina. The degeneration occupied a situation in the nerve corresponding to the part wounded, for example a lesion in one quadrant of the retina caused a degeneration in the corresponding quadrant of the nerve. The degeneration maintained the same situation throughout the whole length of the nerve. In the cases where the opaque bands were incised the degeneration was found to be denser than in the cases where other parts of the retina were wounded. In every case minute black points were found in the nerve of the eye which had not been wounded. These points were diffusely scattered, and much less prominant than those on the side of the lesion; they were found to stand in direct ratio to the amount of degeneration in the nerve of the

operated eye. The second part of the communication consisted of results obtained in the case of a monkey, in which a lesion by means of the galvano-cautery was made between the optic disc and the yellow spot. A well-defined area of degeneration was found in the corresponding optic nerve. It lay externally in the anterior part of the nerve, whereas it occupied a central position in the posterior part of the nerve. Its shape in the anterior part of the nerve was that of a narrow isosceles triangle, with its base at the periphery and its apex towards the central vessels. Behind the entrance of the retinal vessels the area gradually became central; in this situation it assumed a somewhat irregular form with angular projections; near the chiasma it was still in the centre of the nerve, and crescent-shaped. In the other optic nerve small black points were present similar to those found in the case of the rabbits. The interest of this case in relation to the cases of toxic amblyopia and in relation to the course of the macular fibres was indicated.

MR. C. D. MARSHALL said that the results of Marchi's method of staining nerve were not always reliable; black dots were to be found in nerves which were not degenerated. But they readily followed lesions of nerves, and were valuable as a sign of degeneration after lesion.

Congenital Hydrophthalmos. By MR. F. R. CROSS.

Enlargements of the eyeball of this nature depend on an increase of the intraocular tension during youth from whatever cause, with consequent expansion of the corneo-scleral envelope and other ocular tissues. Hydrophthalmos in the young is equivalent to glaucoma in the old. Many of the cases of so-called buphthalmos are but a later stage of staphyloma in childhood; one true form of secondary glaucoma in children results from complete seclusion of the pupil, with bulging of the iris and blocking of the filtration angle. The closure or compression of the filtration angle appears to be the important element in nearly all cases of glaucoma. One of the reasons urged against this theory is the presence of the deep anterior chamber in hydrophthalmos, and the apparent wide separation between the cornea and iris. Careful microscopic examination of sections of hydrophthalmic eyes however show that although the anterior chamber is deep, either the

iris is adherent at its base to the cornea, or strands of tissue are present there blocking up the angle, and indicating a previous adhesions which had broken down. Other theories had been propounded to account for this condition, but they were not sufficient alone, or the data on which they were founded could not be verified by subsequent observers. Thus it was shown by an examination of one hydrophthalmic eye by Durr and Schlegtendal that the vortex veins of the choroid were distended; but an examination of the author's specimens showed a tendency to atrophy of the choroid, not to its cystic degeneration or to distension of its veins.

MR. TREACHER COLLINS pointed out that in the cases of buphthalmos which did not follow on any known antecedent disease the symptoms always dated from birth, and that, therefore, they must look for some congenital malformation as the original cause of the changes which ensued. He showed that sometimes the iris failed to become completely separated from the posterior surface of the cornea, and that a congenital anterior synechia resulted. If such an adhesion existed at the periphery of the anterior chamber it would tend to obstruct the exit of fluids through the filtration area. In several specimens of buphthalmic eyes he had examined he had found an adhesion of the root of the iris to the cornea. In some cases of buphthalmos the tension became normal, and the progress of the disease was arrested; he suggested that in them the enlargement of the globe and the dilatation of the anterior chamber caused the adhesion of the iris to become stretched and sometimes to give way.

MR. PRIESTLEY SMITH thought the specimens showed undoubted obstruction of the filtration angle; the evidence to his mind was quite convincing that the increased tension was due to closure of the angle of the anterior chamber. He had lately visited a blind school where he found 6 children out of 125, or about 5 per cent., blind from congenital hydrophthalmos. He pleaded for the use of the term congenital glaucoma, as these cases undoubtedly belonged to the same group as glaucoma in the adult.

Tension in Cases of Intraocular Growth. By MR. C. DEVEREUX MARSHALL.

With a view of further elucidating the causes of glaucoma

in cases of intraocular neoplasms, 100 cases had been examined, including (A) 53 in which the choroid only was affected; (B) 28 in which the ciliary body or iris was involved; and (C) 19 in which a glioma of the retina existed. Series A: In the first group the intraocular tension was as follows: (1) Increased tension in 36, or 67.92 per cent.; (2) Normal tension in 16, or 30.18 per cent.; (3) ? Diminished tension in 1, or 1.88 per cent. Microscopically it was found that 27 cases out of the 36 in which the tension was increased the angle of the anterior chamber was closed. In 7 the angle was restricted, and in 2 it was not noted. Of the 16 cases in which the tension was normal, the angle was found open in 14, and in 2 cases the condition was not stated. There was no case in which the tension was undoubtedly less than normal, 1 was noted as (?), and in this case the angle was open. Series B: In this group in which the ciliary body was affected the following conditions of tension existed: (1) Increased tension in 10, or 35.71 per cent.; (2) Normal tension in 14, or 56 per cent.; (3) Diminished tension in 4, or 14.28 per cent. Of the 10 cases in which the tension was increased, the angle of the anterior chamber was closed in 6. In 2 it was much narrowed, and in 1 case it was open. Of the 14 in which the tension was normal, the angle was open in 10; in 1 it was narrowed; in 2 it was closed; and in 1 the condition was not stated. Of the 4 cases in which the tension was below normal, the angle was open in 2; in 1 it was somewhat narrowed with a shallow anterior chamber; and in 1 the angle was closed on one side and doubtful on the other, but the ciliary body was to a great extent destroyed by the growth. Series C includes 19 cases of glioma of the retina, and the condition of the tension was as follows: (1) Increased tension in 7, or 36.84 per cent.; (2) Normal tension in 10, or 52.63 per cent.; (3) Diminished tension in 2, or 52.63 per cent. Of the 7 cases in which the tension was increased, the angle was closed in 3, narrowed in 2, open in 1, and in 1 the condition was not stated. Of the 10 cases in which the tension was normal, the angle was open in 7, narrowed in 1. In 1 the globe was nearly full of growth and there was no anterior chamber, and in 1 the condition of the angle is not noted. Of the 2 cases in which the tension was diminished, the angle was open in 1, and in the other the globe was shrinking after having perforated. The vast majority of these cases prove the rule

that the intraocular tumor bears a direct relation to the condition of the angle of the anterior chamber, and also that it is by no means uncommon to have normal or even diminished tension in eyes containing new growths. There are one or two exceptional cases in which the tension is increased when the angle is open, and normal or diminished when the angle is closed, but these are all complicated by a gross affection of the ciliary body, leading either to a considerable diminution of its normal functions, or else probably to the opening of secondary channels through which fluid can escape from the globe.

On the Employment of Electrolysis in the Treatment of Detached Retina. By MR. SIMEON SNELL (Sheffield).

He stated that the recent discussion at this Society indicated that the treatment of detached retina was still regarded as unsatisfactory. Occasional good results were doubtless obtained. A patient he operated upon many years ago by sclerotic puncture, was, he understood, following his occupation, and was dependent upon that eye. He alluded to Terson's advocacy of electrolysis in detached retina. Mr. Snell had employed it in three instances. The first in a hopeless case, simply to test the method, but the detachment was reduced; the second, an extensive detachment had been materially improved in lessening the detachment, increasing the size of the field and considerably improving the vision; and the third resulted in a practical improvement, a much enlarged field, and also improvement of vision from fingers indistinctly to $^{15}/_{c}$. It was too early to state the final result yet. Mr. Snell thought the method was worthy of trial.

Card Specimens.

MR. ADAMS FROST: Pulsating Exophthalmos Undergoing Spontaneous Cure. MR. HARTRIDGE: Slight Buphthalmos and Deep Cupping and Raised T. in a girl aged 9. MR. KENNETH CAMPBELL: Infecting Chancre of Eyelid. MR. PRIESTLEY SMITH: Scheme for the Examination of Ophthalmic Cases. MR. LANG: Double Optic Neuritis.

BOOKS AND PAMPHLETS.

TRAITÉ D'ELECTROTHÉRAPIE OCULAIRE PAR LE DR. P. PANSIER. ("Treatise on Ocular Electrotherapeutics.") By A. MALOINE, Paris. 1896. Price, 6 francs.

This is an exhaustive treatise on the subject of ocular therapeutics based apparently on a long series of experiments in clinical work and is very interesting reading. If the author's experiences are shared by others, this subject will surely deserve in future considerably more of the attention of oculists, as, it seems, there are but few affections of the eye which cannot be beneficially influenced by electricity. The preface of this book is written by Dr. Valude.

DIE AUGENAERZTLICHEN OPERATIONEN. By DR. W. CZERMAK. ("Operations of the Eye.") Nos. 8 and 10. Wien, Carl Gerold's Söhne. 1896. Price, 4 marks.

These two numbers, in the same excellent manner as did their predecessors, treat of the operations on the muscles of the eyeball and on the eyeball itself. The author announces that by his removal to Prague he has been prevented from finishing the work, but promises the last numbers in the near future.

HEILUNG HOECHSTGRADIGER KURZSICHTIGKEIT. ("Cure of Myopia of Highest Degree," etc.). By DR. V. FUKALA. With 28 Illustrations. Franz Deuticke, Leipzig and Wien. 1896. Price, 4 marks.

In this pamphlet the author, whose name will forever be connected with the systematic removal of the crystalline lens from highly myopic eyes, has collected his views concerning the advisability of the operation and his results. This very interesting part is followed by a number of deductions and rules for the quick determination of the length of the axis, the optical constants and the size of the image. No one interested in this subject should fail to read Fukala's work.

DIE FUNKTIONSPRUEFUNG DES AUGES. ("Functional Examination of the Eye.") By DR. ANTON ELSCHNIG. With 31 Illustrations. Franz Deuticke, Leipzig and Wien. 1896. Price, 4 marks.

This manual, addressed to students and physicians, gives in a clear and concise style an excellent exposé of the different aims and methods of the examination of the functions of the eye.

The first part is devoted to the methods of examining the refraction and accommodation, the visual field, color- and light-sense, etc., while its second part treats of the functions of the iris, the eyelids and the external eye muscles. To this is added a chapter on simulation.

While, as far as we can see, not containing anything new, this manual surely appears to be an eminently practical one.

EIN BEITRAG ZUR KENNTNISS DER TUBERCULOSE DER AUGAPFELBINDEHAUT. ("Contribution to the Knowledge of the Tuberculosis of the Conjunctiva.") By DR. E. FRANKE. Alfred Langkammer, Leipzig. 1896.

A carefully observed case of conjunctival tuberculosis in which the local destruction and removal of the infected parts seems to have led to a complete cure.

The report of this case is followed by the discussion of the Literature on this subject.

UEBER CONTRACTUR- AND LAEHMUNGS-ZUSTAENDE DER EXTERIOREN UND INTERIOREN AUGEN-MUSKELN BEI HYSTERIE. ("Contraction and Paralysis of the External and Internal Eye-Muscles Due to Hysteria.") By DR. M. NONNE and DR. O. BESELIN. Alfred Langkammer, Leipzig. 1896.

This is a very interesting contribution to the study of disturbances of the motility of the eyes as they are observed in hysterical individuals, with a careful report of eight cases observed by the author. ALT.

PAMPHLETS.

"Neoplasms of the Ear." By Dr. E. B. Dench.

"Eye-Symptoms in Nephritis." By Dr. D. Cheatham.

"Hydro-Galvanism of the Urethra." By Dr. R. Newman.

"Silver and Silversalts as Antiseptics." By Dr. B. Credé,

"Keratitis Interstitialis Annularis." By Dr. H. Moulton.

"The Development of the Test-Card." By Dr. F. K. Smith.

"Experience With Sero-Therapy in Tuberculosis." By Dr. P. Paquin.

"What is the Matter With the American Stomach?" By Dr. J. K. Kellogg.

"The Relations Existing Between Oculists and Opticians." By Dr. F. Allport.

"Management of Tuberculosis in the Ashville Clinic." By Dr. J. A. Burroughs.

"The Mutual Relations of the Profession and the State." By Dr. W. S. Foster.

"Sponge Grafting in the Orbit for Support of Artificial Eye." By Dr. E. O. Belt.

"The Technics of the Trial Case; or Subjective Optometry." By Dr. A. E. Davis.

"Thirty-Seventh Yearly Report of the Nederlandsch Gasthuis for Ooglijders." July 4, 1896.

"Mastoid and Intracranial Complications of Middle-Ear Suppuration." By Dr. E. B. Dench.

"A Case of Epilepsy and Migraine, Apparently Depending Upon Eye-Strain." By Dr. F. W. Marlowe.

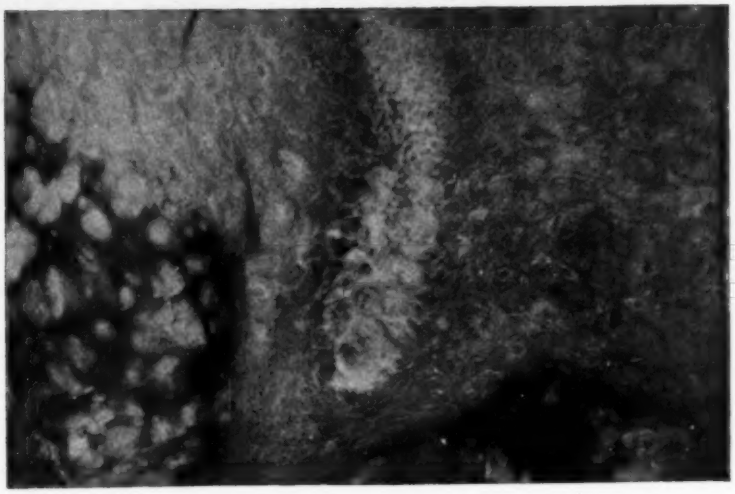

FIG. 1.

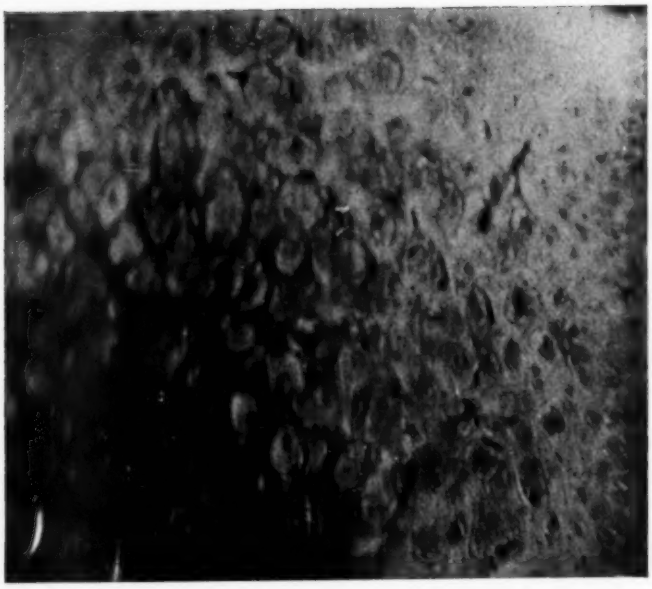

FIG. 2.

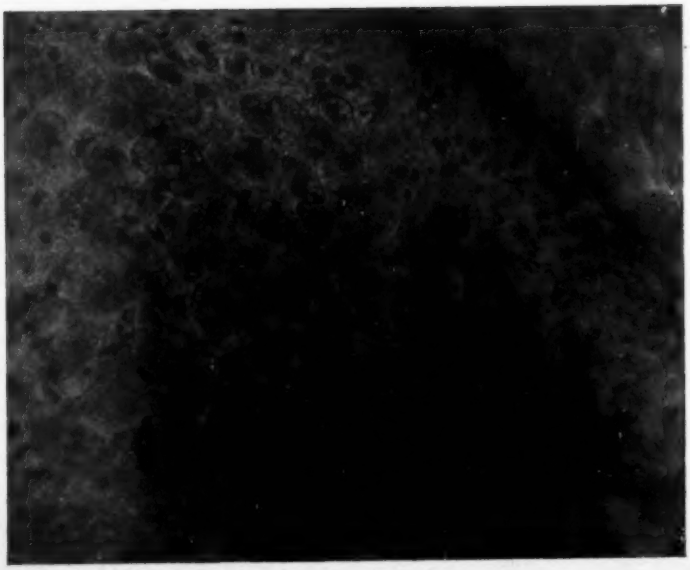

FIG. 3.